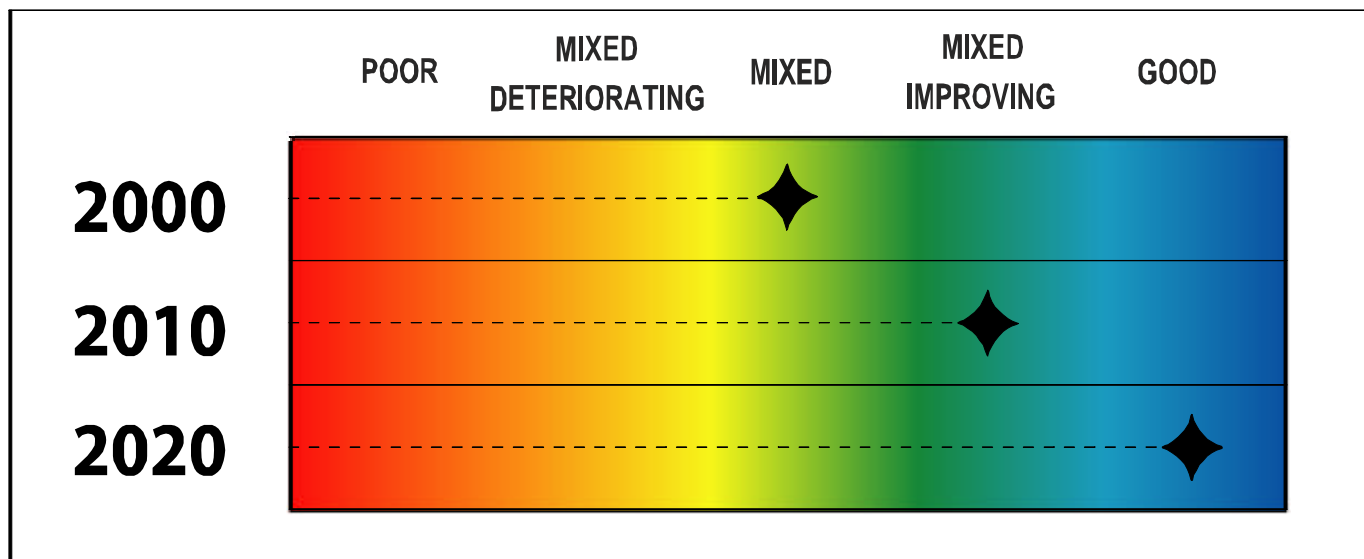


Subgoal 6

Are land use, recreation, and economic activities sustainable and supportive of a healthy ecosystem?



Status

Land use, recreation, and economic activities are more sustainable, healthy and supportive of a healthy ecosystem, but there is significant work that needs to be done. There is more information available on critical ecosystems, significant activity in better managing water resources and determining the true value of a healthy ecosystem. There is danger, however, that the ecosystem could deteriorate if the knowledge is not shared widely and translated into actions.

Challenge

- Land use and human activities are undertaken by individuals aware of the lake ecosystem's capacity to support human and environmental activities.

Sustainability

Effective, sustainable protection of the Lake Michigan ecosystem requires that the LaMP partners focus on promoting balance between the environment and society. The interdependencies inherent in the ecosystem

Chicago's Water Agenda 2003

Chicago's Water Agenda 2003, outlines a strategy for caring for water resources as a whole. The agenda calls for a comprehensive approach to the City's waterways to ensure that they are conserved for future generations, protected improved, and managed. Chicago's Department of Water Management is implementing a five-year, \$620 million capital improvement program that includes replacing approximately 50 miles of old leaking water mains every year. Additionally the Department is helping other units of local governments examine their distribution systems for leaks. The improvements in Chicago alone will save an estimated 120 million gallons of water each day.

The City will continue to review its procedures and implement water conservation measures wherever possible in city buildings and services. Many programs to reduce use in city-owned buildings are already underway. The City is examining the Building Code for opportunities to allow for more efficient fixtures, like waterless urinals and dual flush toilets; explore the potential of installing gray water systems to irrigate landscaping or for flush toilets in public buildings and plant native species that are drought tolerant to reduce the need for watering. Further, the city is developing a plan to meter all residential water use. Currently, many older residential buildings or residential buildings with fewer than three units pay a flat, semi-annual fee for water use.

Study Shows Residential Property Values Could Increase if Sediment Pollution Eliminated

A study conducted by the University of Illinois and the Northeast-Midwest Institute found residential property values throughout Lake County, Illinois could increase by as much as \$333 million if sediment pollution in Waukegan Harbor is eliminated. The study also suggests that redevelopment of the Harbor area, improved shipping, and attraction of new residents and businesses could further add to the benefits of Harbor clean-up.

More information is available at www.nemw.org/Waukegan-July-press-release.pdf

perspective require a balance between three fundamental elements: environmental integrity, economic vitality, and sociocultural well-being. The ability of these elements to function in balance over time is a measure of sustainability. The ecosystem perspective requires a shift of focus from resource programs to resource systems and in some cases their interaction. It places human activities and communities within an ecosystem and consequently, within ecosystem management.

The LaMP helps to identify the activities, partnerships, and locations where ecosystem management needs adjustment in order to attain a sustainable Lake Michigan basin. Sustainable

landscapes are local ecosystems that are healthy enough to provide a range of valuable benefits and services, both now and in the future. Such benefits and services to humans include the following:

- Moderating natural events and human activities. Healthy landscapes can make communities safer and more livable by tempering the effects of natural events and human activities. For example, wetland systems can absorb and store storm waters, thereby aiding in flood control and ensuring more predictable stream flows and water levels and often providing for recharging local ground water.
- Enhancing social well-being. Healthy landscapes provide services that make communities more enjoyable and rewarding. For example, they provide opportunities for outdoor recreation, while also providing habitat for diverse plant and animal species. Plantings along stream banks can also provide buffers to filter pollutant runoff.
- Supporting local economies.

New Information on Groundwater Flow

Groundwater divides are not necessarily the same as the Great Lakes watershed divide. In the Great Lakes basin, most shallow flow discharges to local

Michigan Governor Outlines Comprehensive Water Agenda

Michigan Governor Jennifer M. Granholm sent a special message to the Michigan Legislature in January 2004 in which she unveiled a comprehensive plan to protect Michigan's great, fresh waters. The cornerstone of the initiative is the Michigan Water Legacy Act, a comprehensive water withdrawal statute based on the principles of the Great Lakes Charter, which will subject all significant water withdrawals to review by the Department of Environmental Quality (DEQ) to ensure that Michigan's water resources are not impaired or compromised.

In addition to the proposed Water Legacy Act that was delivered to state lawmakers in February, the initiative includes administrative steps that the Granholm Administration will immediately implement to protect Michigan waters. Those steps include an executive directive that prohibits state agencies from approving the open water disposal of contaminated dredge materials in Michigan waters; and, a second executive directive that asks the DEQ to protect critical isolated wetlands on state land from harm.

Further, the Governor asked the Michigan Attorney General to join a number of environmental and conservation groups in a lawsuit against the EPA to compel them to regulate ballast water discharges, and ask state lawmakers to live up to the 2004 budget agreement by approving user fees to fund the National Pollutant Discharge Elimination System, a critical component in monitoring what goes into our water. The Governor also asked the Bush Administration to fund the first installment of a multi-year Great Lakes restoration effort. The last two activities have been accomplished.

Basin water supply for the Great Lakes

Lake	Overlake Precipitation (percent)	Surface-Runoff (percent)	Indirect groundwater discharge (percent)
Superior	56.3	11.0	32.7
Michigan	56.2	9.3	34.5
Huron	42.2	16.3	41.5
Erie	53.5	24.3	22.2
Ontario	34.8	22.8	42.4

Source: USGS. 1998. Water Supply Paper 98-52, D.J. Holtschlag and J.R. Nicholas

streams - the Great Lakes watershed divide (i.e., the subcontinental divide) also serves as a ground-water divide for shallow flow. Most deep flow discharges to regional sinks and the deep aquifer divide, however, can be distant from the surface watershed divide.

Groundwater's role in the Health of the Lake Michigan Ecosystem

Ground water is a major natural resource in the Great Lakes Region because it indirectly contributes more than 50 percent of the stream discharge to the Great Lakes. In addition, ground water is the source of drinking water for millions of people in the region, is an important source of supply for agriculture and many industries, and provides a relatively uniform supply of water in some ecologically sensitive areas to sustain plant and animal species. Therefore, to improve our understanding of water resources issues in the Great Lakes Region, it is important to have a better understanding of the role that ground water plays in the overall hydrologic system of the lakes. The main ground water resources issues in the Great Lakes Region are related to the amount of ground water, the interaction of ground water and surface water, changes in ground water quality as development expands, and

ecosystem health related to the quantity and quality of water.

A relatively small amount of ground water flows directly to the Great Lakes

The Great Lakes are in topographically low settings that, under natural flow conditions, causes them to function as discharge areas or "sinks" for the ground-water-flow system. Most ground water that discharges directly into the lakes is believed to take place near the shore (Grannemann and Weaver, 1999). Of all the Great Lakes, Lake Michigan has the largest amount of direct ground water discharge (2,700



Figure 6-1 Groundwater Withdrawals in the Great Lakes Region

Milwaukee Sewage District Teams With River Revitalization Foundation for Easement Acquisition Under Greenseams Program

A teaming of the River Revitalization Foundation and the Milwaukee Metropolitan Sewerage District (MMSD) under the Greenseams program purchased a conservation easement on nearly four and a half acres along the Milwaukee River. The easement connects two Milwaukee County owned parcels along the western shore of the river between Gordon Park and North Avenue. The project is intended to protect the riverbank from development and promote greater public use of this land, advancing a policy that provides additional flood protection, reduces dirty runoff and keeps undeveloped riverfront land in its natural state. The purchase price for the conservation easement was \$150,000.

The easement will preclude development of the land and allow MMSD access for flood management projects and other improvements to the natural shoreline. Future Greenseams efforts will increase recreational opportunities for people throughout the MMSD region. For example, the Conservation Fund analyzed undeveloped land in three other Milwaukee watersheds and identified 41 sites, totaling 7,065 acres that contained the necessary soil conditions to provide future flood-reduction benefits. In all, the group estimated the sites could provide 4.7 billion gallons of storage. The sites range in size from 30 acres to 674 acres.

The MMSD Commission approved a plan in September 2001 to work with local community groups, municipalities and others to purchase easements or acquire outright properties identified as critical for guarding against future flooding in the Menomonee River, Oak Creek and Root River watersheds. The Commission approved a contract with The Conservation Fund, a national non-profit conservation organization to act on MMSD's behalf in acquiring easements and property, and administering the program.

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Smart Growth Information Sources

Smart growth is development that serves the economy, the community, and the environment. It changes the terms of the development debate away from the traditional growth/no growth question to "how and where new development should be accommodated."

Smart Growth answers these questions by simultaneously achieving:

- Healthy communities -- that provide families with a clean environment. Smart growth balances development and environmental protection -- accommodating growth while preserving open space and critical habitat, reusing land, and protecting water supplies and air quality.
- Economic development and jobs -- that create business opportunities and improve local tax base; that provide neighborhood services and amenities; and that create economically competitive communities.
- Strong neighborhoods -- which provide a range of housing options giving people the opportunity to choose housing that best suits them. It maintains and enhances the value of existing neighborhoods and creates a sense of community. Transportation choices -- that give people the option to walk, ride a bike, take transit, or drive.
- A sample of smart growth information sources include:
 - <http://www.epa.gov/smartgrowth/>
 - <http://www.cwp.org/index.html>
 - <http://www.lowimpactdevelopment.org/>

ft³/s) because it has more sand and gravel aquifers near the shore than any of the other Great Lakes (Grannemann and Weaver, 1999). Although this is a relatively low inflow compared to the total streamflow into the lake from land areas (41,200 ft³/s) (Croley and Hunter, 1994), it is nearly equal to the amount of water diverted from Lake Michigan through the Chicago Ship and Sanitary Canal (Oberg and Schmidt, 1996).

Ground water provides refuge for aquatic organisms

Ground-water discharge to streams may help provide important habitat for aquatic organisms, including fish. In addition, because ground water temperatures are nearly constant throughout the year, stream reaches with relatively large amounts of ground water discharge can provide refuge to organisms from heat in summer and from cold in winter. For example, some stream reaches in the region remain unfrozen even though air temperatures are well below 32° Fahrenheit. Other possible benefits to the survival of aquatic organisms related to ground water discharge to streams include increasing concentrations of dissolved oxygen, adding small amounts of nutrients that are essential to the health of organisms, providing cold pockets of water in summer, and maintaining streamflow during dry periods.

Issues related to the amount of ground water

Although the amount of water in the Great Lakes Region is vast, issues related to relatively small quantities of water are being raised more and more often. For example, even though the amount of ground water pumped in the region is small compared to the total amount of water present, ground water is an important source of public water supply as well as an important source of supply for industrial, agricultural, and domestic needs. Less clearly understood, however, is the relation between the amount of streamflow discharging to the Great Lakes and the large portion of that flow that originates as ground water. The implications of this understanding for water- and land-use practices and, in turn, their effects on water quantity and quality, have not been fully incorporated into a policy framework. To help include information about the implications of the role that ground water plays in addressing regional water issues, a comprehensive analysis of indirect ground-water discharge to the

Lake Michigan Water Resource Planning Conference **Holiday Inn, Merchandise Mart, Chicago, Illinois**

A conference, "Straddling the Divide: Water Supply Planning in the Lake Michigan Region" is planned for February 15-16, 2005. The objective of the conference is to influence local governments in the Lake Michigan region to integrate water supply considerations including water demand forecasting, land use planning, and water conservation into local and regional planning processes. The one and a half day conference convenes local, regional, and state level policy and decision-makers from Wisconsin, Illinois, Indiana, and Michigan to discuss and strategize about the implications about water supply and water quality issues in the Lake Michigan region. The conference is co-sponsored by the Northeastern Illinois Planning Commission and the Southeast Wisconsin Regional Planning Commission

The conference has a policy track geared toward municipalities, counties, and regions and a technical track geared toward science and engineering in support of regional-scale activities. More information is available at www.nipcc.org.

Michigan Water Bottling Court Case

A Michigan judge ordered the Ice Mountain bottled water plant to discontinue pumping water from wells in Mecosta County, Michigan. The judge ruled the operation damages the environment by depleting neighboring lakes, streams, and wetlands, violating Michigan Environmental Protection Act (MEPA) and other state water laws. A three-judge panel of the state Court of Appeals held that the Ice Mountain operation could continue while it appeals the Mecosta Circuit Court ruling. The appellate panel did limit the amount of water the firm could draw to its current average while the appeal continues.

The Michigan Department of Environmental Quality's Water Division originally granted the permit in 2001 allowing Ice Mountain's water-bottling plant to withdraw up to 400 gallons per minute, or 576,000 gallons per day from four spring wells. The plant's average pumping rate has been around 200 to 250 gallons per minute.

Great Lakes is needed.

Direct ground-water discharge to the Great Lakes is not a large factor in water budget analyses for the Great Lakes. Locally, however, direct ground water discharge to the Great Lakes may be important, even though the rates and places of discharge are

not well known. A long-term evaluation of direct ground-water discharge to the Great Lakes would help place this hydrologic process in proper perspective. Near-shore areas with high rates of direct ground water discharge may provide valuable habitat for aquatic organisms.

Lake Levels

Lake Michigan was measured at 2 feet below the long-term average in 2001, having dropped more than 40 inches since 1997 when it was at near record highs. Levels increased for the 2002, but were still below average. The decrease in precipitation over the last five years and resulted in Lake Michigan being at its lowest point since 1966. Lake levels rose between the mid 1960s and the late 1990s.

The lower lake levels has caused problems for the shipping and boating industry. Cargo ships were forced to lighten their loads, and many boat ramps became inaccessible. According to the U.S. Great Lakes Shipping Association, for every inch of water that Lake Michigan loses, a cargo ship must reduce its load by 90 to 115 metric tons, leading to losses of between \$22,000 and \$28,000 per trip.

Early reports for 2004 indicate that the lake is at about average due to increased rainfall early in the year. This fluctuation may be part of a 30 year cycle but deserves close monitoring.

Lake Level Monitoring

Current Lake Michigan levels can be monitored online through a new National Oceanographic and Atmospheric Administration website, <http://glakesonline.nos.noaa.gov>. The site provides immediate water level and meteorological data from water level stations. There is a 6 minute interval between data readings and plans for real time wind speed and direction data, in addition to barometric pressure and air temperature data. This augments the U.S. Army Corps of Engineers website that provides water level information <http://huron.lre.usace.army.mil/levels/hmpglv.html>.

Great Lakes Charter Annex 2001

There has been increasing focus on the issue of water withdrawals and diversions from the Great Lakes resulting in the Great Lakes Governors and Premiers signing the Great Lakes Charter Annex in June 2001. The Annex is an amendment to the Great Lakes Charter of 1985 which outlined a voluntary process for managing withdrawals of water from the Great Lakes. It sets guidelines for new Great Lakes water withdrawals.

The Annex establishes a series of principles for a new standard used to review new water withdrawals that will require new water withdrawals – whether for use inside or outside the basin - to result in an improvement to the Great Lakes. This standard is the first that would directly link water use to restoration and improvement of the ecosystem. A new draft binding agreement will be released for public review during the Summer of 2004. More information on the Annex is available at www.cglg.org/projects/water/index.html.

Lake Michigan Diversion to Chicago Water Deficit Reduced Faster than Planned

During the late 1990s, the diversion of water from Lake Michigan to the Chicago River exceeded the U.S. Supreme Court consent decree limit (2.1 billion gallons per day) by nearly 15% because of leakage at the Chicago River control works. Following a Memorandum of Agreement among the Great Lakes states, Illinois agreed to reduce its annual diversion over 14 years to pay off its water debt caused by the leakage. Repairs to the Chicago River locks and construction of new control works were completed in 2000.

The most recent certified Army Corps of Engineers information for Illinois' diversion is from 1997. At the end of the 1997 Water Year the cumulative deviation (debt) stands at -3408 cubic feet per second (cfs)-years. The running average of the diversion is at 3400 cfs. The general pace for repayment of the water debt is faster than required under the memorandum of understanding signed by the Great Lakes states in 1995. This is due to the repairs at the river locks and the lower water levels. At one point during the 1990s, the locks did not fully close, allowing the water to flow freely from Lake Michigan. The lower water levels have decreased the amount of water that flows between the lake and the river when the Chicago locks are opened.

Wisconsin Smart Growth Program

The Wisconsin Comprehensive Planning Law was passed as part of the 1999-2001 Wisconsin biennial budget. Although sometimes referred to as the Smart Growth Law, the Comprehensive Planning Law does not actually dictate how or where development will occur. Those decisions are left to local communities. However, because the Comprehensive Planning Law does improve on the amount and quality of communication within and between jurisdictions, it may indirectly lead to more informed decisions that result in smart growth.

The law requires localities to develop a comprehensive plan containing 9 elements:

- Issues and opportunities.
- Agricultural, Natural and Cultural Resources
- Housing
- Economic Development
- Transportation.
- Intergovernmental Cooperation
- Utilities and Community Facilities
- Implementation.

Land Use

After January 1, 2010, all community programs and actions that affect land use must be guided by, and consistent with, the community's comprehensive plan. This will make land use decisions much more predictable. The state provides a total of \$3 million annually to help local communities develop comprehensive plans. To date, the comprehensive planning grant program has awarded \$9.5 million to 535 Wisconsin communities, almost 1/3 of the state. The Comprehensive Planning Law requires public participation at every stage of the comprehensive planning process, including adopting a public participation plan to provide a diverse range of opportunities for the public to help shape the community's comprehensive plan and holding at least one public hearing prior to adopting the comprehensive plan. Plan drafts must be sent to adjacent jurisdictions, the Wisconsin Land Council, the regional planning commission serving the community, the public library serving the area, and all other area jurisdictions located entirely, or partially within the boundaries of the community.

Land Use Impacts Water Quality

The urbanized land area in the United States has quadrupled since 1954. To compound the problem, populations in coastal areas, which contain some of the most sensitive ecosystems, have been increasing even faster than in the rest of the country. From 1982 to 1996, the population in the Chicago-Northwest Indiana area grew by 10.9 percent but consumed 44.2 percent of the land. (Urban Roadway Congestion: Annual Report 1998) Wetlands, which naturally help control runoff from urban areas by storing flood and surface water and slowly releasing and filtering it, have been destroyed in the Lake Michigan basin to a greater degree than elsewhere in the country.

EPA's Office of Environmental Information states that "the construction of impervious surfaces such as roads and rooftops leads to the degradation of water quality by increasing runoff

volume, altering regular stream flow and watershed hydrology, reducing groundwater recharge, and increasing stream sedimentation and water acidity." A 1-acre parking lot produces a runoff volume 16 times as large as that produced by an undeveloped meadow. Many impervious construction materials have higher surface temperatures that may cause ambient air temperatures to rise. When combined with a decrease in natural vegetation, areas are subject to what is called the urban heat island phenomenon, which may increase utility bills, cause health problems associated with heat stress, and accelerate formation of harmful smog. Clearly the effect of urban development on our communities and environment is a cross-cutting issue.

Oil and Gas Drilling in the Great Lakes

With the energy "crisis" in California in 2001 came renewed interest in tapping oil and natural gas

reserves. In the Great Lakes basin, much of these resources lie under the lakes themselves. Drilling under the lakes raises concerns because a spill would lead to harm of the world's single largest source of freshwater.

Due to this concern, an amendment to the Energy and Water Development Appropriations Act of 2002 prohibits all federal and state governments from issuing leases or permits for new oil and gas directional or offshore drilling in or under the Great Lakes for two years. Michigan's legislature passed legislation that would ban all direct and directional drilling in its portion of the Great Lakes basin. Furthermore, a proposed natural gas pipeline for lake bed of Lake Michigan from Wisconsin to Indiana was withdrawn in 2001.

Currently in the Lake Michigan basin, only Illinois has never issued an oil or gas mineral lease for Lake Michigan bottomlands. Indiana has permitted limited exploratory drilling, but no oil or gas has been produced. Wisconsin allows drilling for oil and gas in certain circumstances and Michigan has allowed drilling that begins on land with the pipes "slanting" under the lake.

Next Steps

All of the LaMP subgoals are interconnected with this chapter. For example, subgoal 9 addresses stewardship and is the response to the sustainability challenge. See Chapter 9 for needed steps, and as well as Chapter 2 for source water assessment needs.

Over the next 2 years, the LaMP is also targeting the following for completion:

- Promote studies that provide the status of groundwater resource and impact on water quality and aquatic habitat.

Long-Term Objectives

- Sustainable use of lake resources by 2020.
- Support research and development and monitoring efforts that track the impact of any possible Charter Annex Improvement Standard activities.
- Support studies to determine sustainable yields for Great Lakes water resources, i.e., a Lake Michigan water budget.